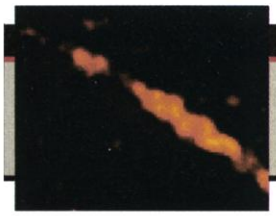


1951
Smeared-out star cluster

LEAD STORY 1954
The Army's frontline biodefense lab

1957
Profile: TIGR's Claire Fraser

Plum Island, the Animal and Plant Health Inspection Service, is also being transferred.

Under the president's plan, the Department of Defense would not give up the nation's premier biodefense lab, the U.S. Army Medical Research Institute of Infectious Diseases in Fort Detrick, Maryland (see p. 1954). But it would apparently relinquish the proposed $420 million National Biowarfare Defense Analysis Center, requested in the current budget, to study the technology and tactics at bioterrorists' disposal.

Marburger says researchers shouldn't expect too many details at this stage. "This was done in a way to dramatize the scope of this change and generate support for a bold initiative," he says. "It is still very much in the abstract and will be refined." Marburger denies that the timing of the announcement—it came the same day an FBI whistleblower delivered damning testimony before Congress about U.S. intelligence gathering—was meant to deflect growing criticism of how the Administration responded to numerous bits of intelligence obtained before the 11 September attacks. "This has been planned for at least a month," he insists.

Government researchers and managers, reluctant to criticize the White House, say they will wait and see what emerges from Congress, which by law must approve any plan of this magnitude. Several hearings are already in the works, some to explore proposals drafted before Bush unveiled his plan.

–MARTIN ENSERINK AND ANDREW LAWLER

AIR POLLUTION RISKS

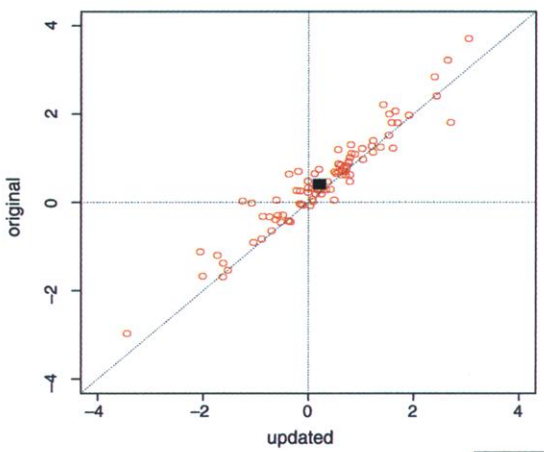
Software Glitch Threw Off Mortality Estimates

The authors of a landmark air pollution study have found a problem with their software application that means they overestimated the risks of fine particles, or soot. The overall conclusions of the group at Johns Hopkins University in Baltimore linking soot and death haven't changed, but the discovery is providing fresh ammunition to industry groups that have criticized the science behind federal air pollution rules issued 5 years ago. The Environmental Protection Agency (EPA) says it will examine whether the rules need to be modified to reflect the new results.

The experience also serves as a cautionary tale to scientists who use off-the-shelf statistics software without questioning what's inside. The Hopkins group "is very good and very careful," says Stanford University statistician Trevor Hastie, yet they used the program for 5 years before catching the problem.

The research, an ongoing project known as the National Morbidity, Mortality, and Air Pollution Study (NMMAPS), is led by Hopkins epidemiologist Jonathan Samet and biostatistician Scott Zeger and funded by the nonpartisan, nonprofit Health Effects Institute (HEI) in Cambridge, Massachusetts. Started in 1996, the project expands on earlier studies in several cities documenting that when daily levels of tiny soot particles rise, slightly more people die from heart and lung disease. These so-called "time series" studies helped persuade EPA to issue its first regulations limiting permissible levels of very fine particulate matter (PM), known as $PM_{2.5}$, in 1997.

In NMMAPS, the Hopkins scientists sought to determine whether the case against fine particles held up across a much larger number of cities—90 in all. Such time-series studies are tricky because they seek to disentangle the role of particles from other factors that can also boost death rates, such as heat waves. The team used a model, the Generalized Additive Model (GAM), that is part of S-plus, a widely used statistical software package. The software searches for a pollution effect and smooth functions of the confounding variables in an iteration that continues until the results don't change much.



Recalculating the risk. In this reanalysis of air pollution data, the vertical distance of dots from the diagonal line shows how much the estimated excess death rate was off for each of 90 cities. Black square represents updated (0.27% per 10 $\mu g/m^3$ of PM_{10}) and original (0.41%) pooled estimates. Diesel exhaust (*right*) is one source of fine particles at center of debate.

Since NMMAPS began, the Hopkins team has published more than a dozen papers linking fine particles and premature deaths (*Science*, 7 July 2000, p. 22). But about 10 weeks ago, says Zeger, "something struck me as funny about the way the software was working." Eventually, his team figured out that the trouble was an S-plus GAM default setting. The software was set to stop calculating when a certain result differed from the previous one by 0.001. But the Hopkins researchers realized that because they were looking at a tiny rise in daily death rates, they needed to keep going. When they changed the default from 10^{-3} to 10^{-15}, they got slightly different risks for most cities (see graph).

Their revised result for all 90 cities was a 0.27% rise in mortality per 10 micrograms per cubic meter ($\mu g/m^3$) of PM_{10} (a class of particles that includes $PM_{2.5}$) compared with 0.41% per 10 $\mu g/m^3$ in the original study. The NMMAPS group informed HEI and is notifying the journals that published its papers.

Industry groups are crowing. Allen Schaeffer, executive director of the Diesel Technology Forum, says the error suggests that more work should be done before the current regulations are fully implemented. "If the risks have been exaggerated, we have to understand the real risks," he says.

Industry complaints aside, both scientists and EPA officials say that the S-plus problem does not undermine the 1997 soot rule. "The underlying relationship is still solid," says John Bachmann of EPA's air office. Indeed, another type of study looking at how death rates vary in polluted cities over many years makes an even stronger case against fine PM than the daily studies, notes HEI president Dan Greenbaum. However, Bach-

CREDITS: (LEFT TO RIGHT) F. DOMINICI *ET AL.*, JOHNS HOPKINS BLOOMBERG SCHOOL OF PUBLIC HEALTH; TED SPIEGEL/CORBIS

mann says, "a few" of the time-series studies that EPA drew on to set the daily limit on fine particles "used the same S-plus approach." Agency scientists will take that into account in their latest review of $PM_{2.5}$ science, which will delay the next version of the rule. Bachmann says the standard "could" change, but "it's too soon to tell."

Scientists in other disciplines, from economics to genomics to ecology, use the S-plus GAM model. David Smith of Insightful Corp. in Seattle, which sells S-plus, says "it's really hard to say" whether many other researchers have had this problem, but his inquiries to some 2000 S-plus users on an e-mail list last week suggest not. Hastie, who co-wrote the S-plus GAM, says these pollution studies are "an unusual situation" because "they're doing very fine-scale modeling, and the effects are very small."

Biostatistician Gerald van Belle of the University of Washington, Seattle, notes that a recent journal article pointed out that defaults can also gum up results with a popular stats package called JMP. Says van Belle: "99% of people are going to be working on problems for which the default settings are appropriate." But when their problem is unusual, he says, they might need to take a look inside the box of their statistics package.

–JOCELYN KAISER

DOE WEAPONS LABS

Livermore Keeps It All in the Family

The appointment of an insider to head Lawrence Livermore National Laboratory ends a politically charged search that highlighted the sharp tensions between the lab's managers, the University of California (UC), and its boss, the Department of Energy (DOE). The new director, theoretical physicist Michael Anastasio, takes the job just as President George W. Bush has assigned the lab a more visible role in U.S. homeland defense (see p. 1944).

Anastasio, 53, was appointed 4 June to succeed Bruce Tarter, who is stepping down 30 June after 8 years as head of the $1.5 billion nuclear weapons lab. "He's the safe choice," says one Livermore researcher about the 20-year Livermore veteran, who has led the division that designs plutonium triggers in nuclear weapons as well as the effort to ensure the safety and reliability of those weapons without testing them. In a press conference, Anastasio backed the Administration's policy not to test nuclear weapons and pledged good relations with the university and Los Alamos National Laboratory in New Mexico, Livermore's longtime rival.

Final choice. Michael Anastasio prepares to lead Lawrence Livermore lab.

CREDITS: (TOP TO BOTTOM) P. BAGLA; JAY SOLMONSON/*TRI-VALLEY HERALD*

Those relationships require much mending. The university, which operates both Livermore and Los Alamos for DOE, came under withering fire this spring for attempting to appoint Ray Juzaitis, a senior administrator at Los Alamos, to head Livermore (*Science*, 3 May, p. 821). Juzaitis eventually withdrew from consideration, and last week a chastened UC president Richard Atkinson took responsibility for the episode, saying, "I failed to communicate with the key people. ... It was my fault."

Both Livermore and Los Alamos have been criticized heavily in the past 2 years for cost overruns, breaches in national security, and alleged racial profiling and discrimination. DOE has pressured the university to tighten its managerial reins and reduce the traditional rivalry between the two labs. Choosing a Los Alamos employee to head Livermore was part of a strategy directed by John McTague, a former science adviser to President Ronald Reagan who now oversees the labs for the university.

But when word leaked in April that Juzaitis was the favored candidate, Livermore's supporters went into high gear. They complained to the White House, DOE, and lawmakers that he was too junior—and that he had overseen the division that included Wen Ho Lee, a physicist accused of improperly copying classified material. On orders from DOE, Atkinson abruptly canceled a press conference at which he was to announce the new director.

The following week, Juzaitis declined what he calls a firm job offer. In a 30 April letter to Atkinson, Juzaitis says he withdrew because of "negative reactions in Washington, within the university, and at Livermore." He also decried the "unwarranted linking of my name to the Wen Ho Lee affair."

Government officials who decline to be identified complain that UC officials did not reveal Juzaitis's link with Lee in discussions with Administration managers and congressional lawmakers. "It shows a complete lack of political savvy," says one. Representative Ellen Tauscher (D–CA), who represents the Livermore area, at the time criticized UC's failure "to be sensitive to national security, the culture, and the unique qualities of the labora-

ScienceScope

Scientist-Statesman The father of India's missile program has been nominated to be president of the country. If chosen, Avul Pakir Jainulabdeen Abdul Kalam (below), an aeronautical engineer, would be the first scientist to hold the largely ceremonial position.

Kalam, 71, is the former head of the Defence Research and Development Organisation, where he spearheaded India's guided missile program and played an important role in preparing for the country's 1998 nuclear tests. A civil servant with no known political affiliations, Kalam is also a member of India's Muslim minority, which the Hindu-led government has been working to win over. An election will be held next month if an opposition candidate is put forward.

Kalam is a "remarkable team person, full of humility," says Martanda Varma Sankaran Valiathan, president of the Indian National Science Academy in New Delhi, adding that his selection shows the importance of technology development to the country. Last year, Kalam stepped down from a 2-year stint as the government's principal scientific adviser to work with students considering careers in science.

Nanocoordination? A bigger effort is needed to coordinate science on the smallest scale, according to a report released this week by the U.S. National Academy of Sciences. Fifteen federal agencies and departments currently participate in the U.S. government's National Nanotechnology Initiative, which has spent some $1 billion over the last 2 years to promote science at the atomic scale. Although the agencies meet regularly to mesh their programs, the report concludes that they could use more help.

Samuel Stupp, a materials scientist at Northwestern University in Evanston, Illinois, who chaired the 16-member panel that wrote the report, says the biggest problem is that there is "no advice from outside" or straightforward way "to seek opinions from the community at large."

To build those bridges, the panel recommends that the White House Office of Science and Technology Policy (OSTP) set up a new advisory board of outside scientists to coordinate nanoscience strategy. It also suggests that the office manage a special grant fund for interdisciplinary research. OSTP currently does not hand out any money. OSTP officials say they are studying the recommendations.