notify the system's automated address changer. "It just needed a cooling off period," he says, for all the previous errant messages to bounce back and be purged from the system. But he admits that the way he did it was calculated to light a fire under the government to provide more resources for the operation.

Ginsparg, a theoretical physicist by profession, had been running the e-print archive singlehandedly since he originated it 2 years ago. He has repeatedly requested funding from DOE, NSF, and his own laboratory administrators to help run the system, with no luck whatsoever. As Ginsparg tells it, none of them had been willing to step forward and offer support.

Ginsparg was not asking for much: for starters, a low-level employee to do administrative labor and go through the e-mail bounceback would help. A talented programmer, who could implement Ginsparg's ideas for improving the system and set up new archives when necessary, would be even better. Ginsparg himself is too busy writing grant proposals to do it himself, he says.

The problem, says Ginsparg, is that funding agencies are not set up to react quickly to these new forms of databases that are appearing as community services on the electronic network. "They never existed before," says Ginsparg. "And you can't convince government agencies that this is something they will have to deal with." Ginsparg adds that it is hard to get the attention of these agencies because so few administrators use e-mail themselves. NSF was the one agency that expressed interest, but NSF is not supposed to fund research at a DOE laboratory.

Two days after Ginsparg shut the system down, however, the Los Alamos computer and communications division finally decided that the lab's library would be given responsibility for the archives. According to Hassan Dayem, the division leader, the head of the library was already searching for an employee to be assigned the task of maintaining the e-print archives and a programmer would be recruited to write software to improve the system.

Ginsparg says he was "staggered," by the beneficent response from his laboratory. While he sheepishly concedes that he wasn't thrilled about having to use radical shutdown tactics to get results, he is elated at the results themselves. "Everything we've been trying to do for the last 10 months will actually happen. I had no idea that this was going to be so effective."

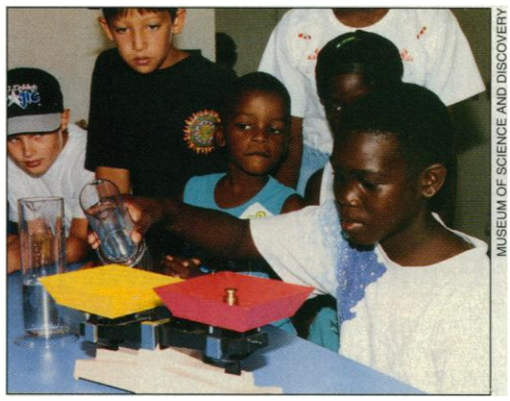
On 30 September, Ginsparg returned the e-print archives to full working order, and physicists around the world found that, once again, they could face the day.

–Gary Taubes

SCIENCE EDUCATION

Moving Science From Museum to School

Field trips to the local natural history or science museum are standard elementary school fare, but in Nebraska, thanks to a $500,000 grant from the Howard Hughes Medical Institute (HHMI), the museum is the one making trips to the schools. The University of Nebraska State Museum at Lincoln is using the Hughes money to start a 5-year project to create 12 education kits—on topics ranging from water to dinosaurs to the stars—that will make the rounds of schools all over the state. "The kits are extremely valuable. They bring hands-on science right down to the elementary student level," says Rosemary Thornton, a K-6 science teacher at Fredstrom Elementary School in Lincoln. Each kit has everything a teacher needs to instruct a class for anywhere from an hour to a complete month. One kit on pollen includes microscope viewers, pollen, and flowers—carefully embedded in acrylic, so the kids won't be allergic—as well as extra resource books and a video in which a pollen scientist describes how she puts her knowledge of pollen to work in forensics.



MUSEUM OF SCIENCE AND DISCOVERY

Balancing act: Third-graders get excited about physics when the Museum of Science and Discovery comes to visit their class.

The Nebraska grant is just one of 51 given to museums during the past 2 years by HHMI, all with the same goal: to get elementary school kids excited about science. HHMI initiated the program last year, and gave out $6.4 million in 5-year grants to 29 museums. This year, the number of meritorious grant applications was so overwhelming that, last month, HHMI announced it is expanding the program. It has given out another $4.2 million for 22 new grants, this time including zoos, aquariums, and botanical gardens. The new grant money means that HHMI, which has established itself as a major force in cutting-edge biomedicine, is now a powerful player in museum science education. It is second only to the National Science Foundation, which spent approximately $17 million on science education programs in museums during the 1993 fiscal year.

A key goal of the HHMI museum program is to use mobile exhibits and classroom curricula to teach kids how science is actually done, says HHMI's program officer for precollege science education, Kathi Hannah. "Children know how to ask questions. We want these programs to teach them how to answer those questions," she says.

The museums have created programs with a variety of different curricula: Some take kids on outdoor field trips, some send books and videos to the classroom for indoor learning, and some opt for long-term involvement, aiming to teach different subjects to a class throughout several years in elementary school. Currently most of the programs are in trial stages, but teachers who have participated in the pilots give them high marks, mostly because the programs do their best to work within the preexisting curricula. "Everything has to fit in with the state standards and our school program," says Denise dePasquale, a third-grade teacher at the Colbert Elementary school in Fort Lauderdale, who worked with that city's Museum of Science and Discovery on a pilot program. "They were very open to our suggestions and took a lot of time to make sure everything fit." Adds Leticia Matienzo, another third-grade teacher at Colbert Elementary, "We're excited about their bringing concrete science right into our classroom."

While the new programs may be adaptable to current standards, they depart from traditional elementary school science by tackling more than the mere cataloguing of bugs and plants. Instead, they aim to impart general themes of scientific inquiry. The Museum of Discovery and Science, for example, entitles its program: "Balance, template, iterations and code." These words weave their way through modern genetics, cell biology, physics, and environmental science, says project director M.J. Morse. To learn about ecological balance, for example, the kids place blocks representing a certain amount of rainfall on one side of a seesaw. On the other side they carefully add blocks that represent water consumption until they have a perfect balance, thus emphasizing the crucial need for ecological equilibrium. The kids go on to learn about balance in gravitational forces and in the perfect homeostasis of a living cell. "We're not just giving kids little balloons of information," says Morse. "We give them beams, a framework onto which they can attach their knowledge."

–Karen Fox