ACADEMIC EARMARKS

Pork Takes a Bite Out of NASA's Science Budget

Kentucky senator boosts state university's astronomy program—at the expense of NASA's regular research activities

Western Kentucky University is not a center for cutting-edge research in physics and astronomy, and it did not rate a listing in the National Research Council's review of graduate research departments in 1995. But the Bowling Green school has bold plans to operate four telescopes scattered around the globe, and eventually one in space, and it has an important benefactor: Congress. Thanks to some legislative language inserted by Senator Mitch McConnell (R–KY), NASA will spend $1 million for the second straight year to help the university begin fulfilling its dreams of joining the elite ranks of U.S. physics and astronomy departments. Welcome to the world of academic pork.

Streaking ahead. Senator McConnell wins earmark for Western Kentucky University telescope.

Across the country, dozens of universities, museums, and research organizations scored a windfall like Western Kentucky's in NASA's 2000 budget. It arrived in the form of unrequested spending, called earmarks, inserted by Congress. Although academic pork projects are nothing new in the federal budget, the dollar amounts at NASA are increasing dramatically, from $65 million in 1997 to $375 million in 2000. And space science's share of that figure has risen even more steeply—from $16 million in 1998 to $73 million in 2000. "Two years ago, you had to look hard to find an earmark in the space science budget," says an agency source. The specially designated projects are also beginning to pose a significant threat to established agency research programs and peer-reviewed science, say NASA officials. At a time when the space agency has trimmed its workforce substantially, "each earmark is labor intensive and high maintenance," says one agency manager.

The nature of the earmarks began to change last year, when lawmakers included a whopping $250 million in unrequested funding in NASA's overall $13.5 billion budget. Previously, the typical earmark merely added funding to an existing NASA program. But starting in the 1999 budget, a large chunk began going to non–space-related research—and it came directly from NASA's already tight research budget rather than from other areas. "Congress used to be hands-off about science," says one NASA official. "These earmarks started out in the NASA education budget, but that was too small to handle all of them, so they've been passed to other programs." Those other programs are the core of NASA's research mission—space science, earth science, life and microgravity sciences, and advanced technology. "It's absolutely a threat" to peer-reviewed research, says Kevin Marvel, a spokesperson at the American Astronomical Society in Washington, D.C.

For NASA space science chief Ed Weiler, the ballooning earmarks mean he will have to cut funding for research and analysis—money that primarily goes to outside scientists to study space science data—by about 5%, or $11 million. Data analysis for specific missions such as the Hubble Space Telescope and Ulysses will be cut a total of $8 million to $10 million, while work on a solar probe will be slowed to save $2 million, he says. And advanced technology will be trimmed by $16 million, affecting NASA's long-term plans to visit Europa and Pluto.

Instead, Weiler will spend $2.5 million on the Bishop Museum in Honolulu, Hawaii, a favorite of Senator Daniel Inouye (D–HI); $4 million, courtesy of Representative Alan Mollohan (D–WV), on a museum attached to the Green Bank Radio Telescope Observatory in his home state; and $4 million for the Sci-Quest hands-on science center in Huntsville, Alabama, thanks to Representative Bud Cramer (D–AL). Another half-dozen museums will each receive from $500,000 to $3 million.

In contrast to these brick-and-mortar pork projects, Western Kentucky's earmark is easier for NASA officials to swallow. "At least it is related to space science," says one agency source, although it involves ground-based astronomy, which is the traditional responsibility of the National Science Foundation (NSF). The small school also has a respected faculty. "They have some good people" who do high-quality work, says Richard Green, director of the Kitt Peak National Observatory in Tucson, Arizona. A NASA official describes physics and astronomy chair Charles McGruder as "very bright and very impressive."

McGruder wants to operate a network of automated ground-based telescopes that will search for extrasolar planets and active galactic nuclei that may be powered by enormous black holes. The two projects demand continuous observation of the skies. Last year Western Kentucky received $1 million, compliments of McConnell's position on the Senate Appropriations Committee, to refurbish the university's 24-inch (61-centimeter) telescope and to plan how to operate three additional instruments. Separately, Western Kentucky is leading a consortium of universities negotiating with NSF to operate Kitt Peak's 1.3-meter telescope, which became available after the current manager, the National Optical Astronomy Observatories, decided to focus resources on larger instruments. The NASA money will help refurbish and operate that instrument in the coming year. In addition, McGruder intends to build a 24-inch telescope at a still-undetermined site in Hawaii, and a 24-inch telescope at the Wise Observatory in Israel, seeded with a bit of NASA money.

The Kitt Peak consortium, which includes the University of California, Berkeley, and South Carolina State University in Orangeburg, will also kick in funding for these projects. McGruder says there are no firm figures for how much the total effort will cost, but he's definitely thinking big. "This is the first stage in a long-term project to lead us into space," he says. "We want our own space mission."

Indeed, McConnell's 17 September press release touting the senator's help in securing the funds states that the $1 million will go "for the operation of an advanced satellite telescope." Once the Kentucky and Kitt Peak telescopes are complete, "NASA will construct and launch the accompanying satellite," according to the statement. That's news to NASA officials, who say they have no idea what the senator is referring to—and that orbiting telescopes cost at least hundreds of millions of dollars. McGruder says that the senator's statement "is not quite correct," and that the funding is really for the ground-based observatories. But NASA officials worry that the earmark could turn into a downpayment on a mortgage the

CREDIT: (LEFT) AURA/NOAO/NSF

space agency does not want to hold.

For NASA, such earmarks require more than just taking the money out of existing programs, mailing a check, and writing off the loss as the cost of doing business with Congress. "We have to make a silk purse out of a sow's ear," says another space agency source, explaining that each beneficiary must write a specific proposal that must be reviewed—and often sent back for revisions. For universities lacking the experience of working within the complex federal guidelines, says one agency official, "there's a lot of handholding. And it comes at a time when NASA's budget is shrinking." Western Kentucky's initial proposal, for example, was "embarrassing" in the vague way it defined how the $1 million would be spent, recalls one official. "We didn't know what to write," McGruder admits. "We didn't have guidelines." Later versions proved better, but the agency will have to go through the same process before disbursing the $1 million allocated in 2000.

Politicians brush aside criticism of earmarking. "We're not spreading the wealth like we should," says Senator Conrad Burns (R–MT), who succeeded in earmarking $2 million in the space science budget for Montana State University in Bozeman to study life in extreme environments. "The MITs of the country have a great lobby compared to Montana State, and we're just leveling the playing field. So maybe earmarks can do some good." McGruder agrees. "There's no question a lot of people don't like [earmarking]," he says. "But overall it is a positive thing."

NASA officials concede that smaller universities are at a disadvantage, particularly in astronomy, where major research institutions dominate the discipline's landscape. "It's hard for a new group to develop observing capability and get into the game," says one. "But the ultimate question is whether this is the right way to do it." **–ANDREW LAWLER**

NEUTRINO PHYSICS

Squabbling Kills Novel Korean Telescope Project

HANUL was Korea's ticket to global collaboration in basic research. But that teamwork remains as elusive as the neutrinos it hoped to detect

SEOUL, SOUTH KOREA—The Korean government has ended funding for a novel aboveground neutrino telescope that was also meant to serve as the country's coming-out party for international research collaborations. Last summer's decision to kill the HANUL project has come to light only recently, however, amid a flurry of vituperative exchanges among the participants.

Personal animosity between the project's creator and its principal investigator (PI), a rigid bureaucracy, a slipping schedule, and doubts about its technical feasibility all seem to have a played a role in the project's demise. But researchers also point to what they call the "Korean disease," a zero-sum mentality Koreans blame for everything from unyielding cab drivers to brawling lawmakers. "We have to learn to collaborate and respect each other's opinion," says Chungwook Kim, president of the Korea Institute for Advanced Studies and chair of the government's review of the canceled project. "Real cooperation in experimental high-energy physics in Korea appears to be very difficult."

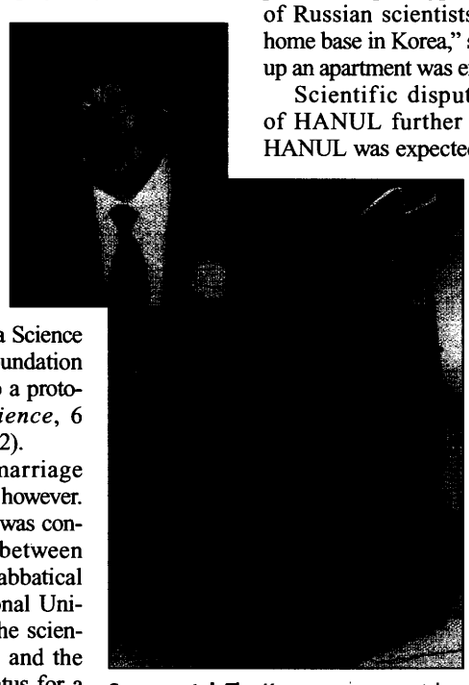
The idea for HANUL, which stands for High-Energy Astrophysics Neutrino Laboratory but also means "sky" in Korean, came from Wonyong Lee, a Korean-born physicist at Columbia University. The telescope would have employed an unusual aboveground detector smart enough to pick out neutrinos—chargeless and nearly massless particles that can flow through matter like sunlight through glass—that are produced by exploding stars, black holes, and other sources in the distant universe from background noise. In addition to complementing existing experiments in Japan and under the South Pole, HANUL was seen as a way to draw international scientists to Korea and expose local students to cutting-edge research. "The idea was to do something in Korea," says Lee.

But Lee, who came to the United States in 1953 as a college student and has been at Columbia since 1962, is a U.S. citizen, and Korean rules bar foreigners from working as PIs unless they are employed by a Korean institution. So he and his colleagues invited Jin Sop Song, a physicist at Gyeongsang National University in Chinju, to be the PI and recruited other Korean scientists. In late 1997 the team won a $350,000, 2-year grant from the Korea Science and Engineering Foundation (KOSEF) to develop a prototype detector (*Science*, 6 February 1998, p. 802).

The arranged marriage quickly turned sour, however. Observers say there was considerable friction between Lee, who spent a sabbatical year at Seoul National University overseeing the scientific collaborations and the experimental apparatus for a prototype, and Song, who was responsible for overall project management, including finances. Lee says that he chose Song not principally for his knowledge of physics but because he was a Korean citizen with few enemies, and observers say that at meetings Lee assumed the role of project leader. Song and others, according to observers, believed that Lee was acting "too American" and that his blunt style of speaking antagonized people. Song showed his displeasure in small ways, for example, by convening a meeting while Lee was in the United States and sticking to rules that blocked the flow of money to Seoul National, where Lee was working on detector components.

Outside forces were also at work. Government policies also hindered the transfer of money to U.S.-based groups working on parts of the prototype and a visit from a team of Russian scientists. "I couldn't build a home base in Korea," says Lee. "Even setting up an apartment was extremely difficult."

Scientific disputes about the design of HANUL further clouded the picture. HANUL was expected to observe rare collisions between neutrinos and atoms in small tanks of water. Such interactions spawn charged particles called muons, which generate flashes of light as they dart through the water. HANUL would measure the energy of the muons by seeing how much a strong magnet could force them off course. The energy levels, in turn, would let the investigators distinguish muons coming from nearby background radiation from muons



Scrap metal. The Korean government has shelved Wonyong Lee's plan to build an aboveground neutrino telescope. A piece of a prototype detector is shown above.

CREDITS: (TOP TO BOTTOM) W. LEE; HANUL/GYEONGSANG NATIONAL UNIVERSITY