HOMELAND SECURITY

New Agency Contains Strong Science Arm

A new player is set to burst on the U.S. science policy scene. Congress this week put the finishing touches on legislation to create the Department of Homeland Security (DHS), which will combine 22 existing government agencies and spawn an array of new science-related programs. Much to the delight of biomedical research advocates, lawmakers rejected proposals to give the mammoth agency control of major bioterror research and regulatory programs.

SCIENCE IN THE NEW DEPARTMENT

- Undersecretary for science and technology
- 20-member R&D advisory board
- Homeland Security Advanced Research Projects Agency, with up to $500 million in 2003
- Nonproliferation, pathogen, and animal-science programs from other agencies
- At least one university-based research center
- Homeland Security Institute
- Advisory role for NIH bioterrorism research and regulation of potential bioweapons

"We're very pleased at how this is turning out," says Janet Shoemaker of the American Society for Microbiology in Washington, D.C., one of several science and university groups that lobbied hard to shape the new department, which is designed to shore up the nation's defenses against terrorism.

Bush Administration officials say it will take at least a year to set up DHS, which is expected to start life with more than 150,000 employees and a budget of $37 billion. Although spending details are still scarce, analysts estimate that nearly $1 billion of those funds could go to R&D efforts. The portfolio will be managed by a new undersecretary for science and technology, who will take advice from a 20-member advisory panel.

The biggest single chunk of science-related cash—up to $500 million next year—will go to a new Homeland Security Advanced Research Projects Agency (HSARPA). Modeled after its namesake in the Department of Defense, the new agency will dole out competitive grants and contracts to universities and companies working on an array of detection and border-security technologies. The legislation creates at least one university-based research center for the purpose—an idea championed by Texas A&M University in College Station—as well as an independent think tank, the Homeland Security Institute, in line with a suggestion from the National Academy of Sciences. The new department can pick one of the Department of Energy's (DOE's) national laboratories to coordinate government research efforts. In addition, it will take control of DOE's nonproliferation and pathogen research efforts and an animal-health laboratory in Plum Island, New York, run by the U.S. Department of Agriculture (USDA).

Lawmakers opted not to give DHS control of other major science programs, as President George W. Bush had originally proposed, apparently agreeing with research lobbyists that the new department will lack the necessary expertise. A $1.5 billion bioterror research program will stay under the control of the National Institutes of Health, for instance, although DHS will have a say in setting its course. Similarly, the Centers for Disease Control and Prevention and USDA will continue to regulate laboratories working with potential bioweapons, although DHS can nominate new organisms to be regulated. Congress also nixed moving a cybersecurity program from the National Institute of Standards and Technology. "The science lobby is happy with what [Congress] did but even happier about what [it] didn't do," says one congressional aide.

As *Science* went to press, the Senate rejected a proposal to strip seven controversial provisions from the bill, including one that gives vaccinemakers protection from lawsuits. But Republican leaders agreed to revisit several of the measures next year, including the one creating university-based centers.

–DAVID MALAKOFF

NUCLEAR PHYSICS

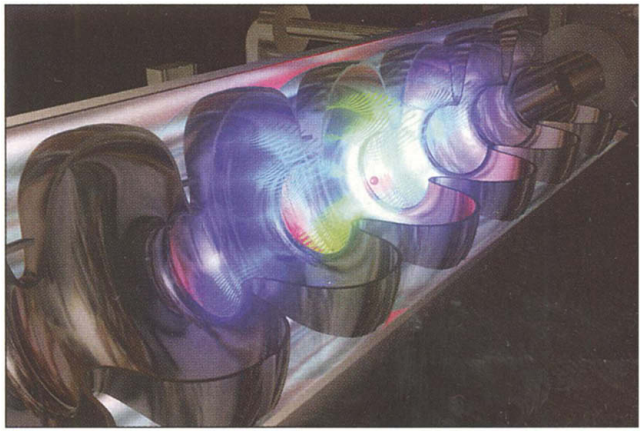
TESLA Accelerates; ESS Falls Back

BERLIN—European physicists this week got mixed news from an eagerly awaited review of a pair of high-profile projects. As anticipated, Germany's science council on 18 November backed plans for a massive new linear collider, the $3.5 billion TeV Energy Superconducting Linear Accelerator (TESLA). But the council disappointed proponents of a $1.4 billion European Spallation Source (ESS), demanding a rewritten proposal before the machine would be considered for government funding.

In fall 2000, Germany's science ministry asked the independent science council to evaluate proposals for nine major projects—with a combined price tag of more than $6.7 billion—to help it allocate a limited pot of research funding. In a preliminary report last July, the council recommended speedy funding for two smaller projects: a $25 million laboratory for very high magnetic fields in Dresden, and a $97 million airplane for atmospheric research. The council said that three big-ticket projects required a few revisions but were worthy of funding. TESLA, based at the DESY synchrotron in Hamburg, is a 33-kilometer-long machine that would complement the Large Hadron Collider, now under construction at CERN, the European laboratory for particle physics near Geneva. The council also liked a companion project to TESLA, a $673 million free-electron laser, and a $675 million accelerator at the Heavy Ion Research Center in Darmstadt, which would, among other things, allow high-energy physicists to probe how stars cook fundamental nuclear particles into elements (see p. 1544).

Left out in the cold was ESS, which would produce high-energy neutrons for materials science and biology research. The council concluded that the proposal from the Research Center Jülich, one of several sites vying to host the project, had not made a strong enough case to merit funding. That assessment angered many in the neutron physics community, who protested that the review committee had underestimated the machine's potential research payoff (*Science*, 18 October, p. 543).

In its final report this week, the council kept ESS in the lowest of its three categories, along with a polar-drilling research ship and a free-electron laser proposed by the BESSY synchrotron in Berlin. But it offered them the chance to submit new proposals based on additional planning. These would be evaluated and considered as the government sets funding priorities in the coming years, says council chair Karl Max Einhäupl.



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Green light. The 33-kilometer-long TESLA got high marks from Germany's science council.

ESS backers are putting a brave face on the disappointing news. Peter Tindemans, chair of the ESS council, insists that the council's decision is actually a welcome sign. "There is broad support for neutrons, and I am certain the final assessment will be positive," he says. Others are less sanguine. ESS "is not dead in the water, but it certainly missed a major opportunity," says nuclear physicist Claus-Konrad Gelbke of Michigan State University in East Lansing.

The council's recommendations leave TESLA and other highly rated projects with one last hurdle: the German government's final decision on funding, which is expected in 2003. In contrast, Gelbke notes, ESS "is scrambling to get its feet on the ground."

–GRETCHEN VOGEL

BANGLADESH

Agricultural Pumping Linked to Arsenic

In Bangladesh, groundwater has been both a blessing and a curse. Irrigation wells have helped end deadly famines. Yet millions of other wells dug to provide safe drinking water are laced with arsenic from ancient sediments, endangering human health. Now one study suggests that pumping for irrigation might be at least partly to blame for the poisoned water, although the finding is controversial.

On page 1602, a team led by hydrologist Charles Harvey of the Massachusetts Institute of Technology concludes that agricultural pumping might influence the release of arsenic into drinking water. That could signal the need for deeper drinking-water wells. "This is really important" if true elsewhere in the country, says physical chemist Stephan Hug of the Swiss Federal Institute for Environmental Science and Technology (EAWAG) in Dübendorf. But Hug and other experts caution that the finding might not be broadly applicable.

Arsenic levels in some drinking-water wells are high enough to thicken and discolor skin and raise the risk of various cancers. One explanation for the presence of dissolved arsenic, suggested in the late 1990s, was that irrigation pumping lowered the water table, leading to oxidization of the arsenic-bearing pyrite. Researchers at the British Geological Survey and University College London (UCL) later disproved this idea. UCL researchers favor another geochemical mechanism: Organic material from buried peat has been reducing iron oxides and releasing arsenic into the water ever since the last ice age.

But Harvey suspected that irrigation must play a role. During the dry season, a tremendous amount of water is pumped from the ground; this water is later replaced by monsoonal rains and local surface water. The heightened circulation "clearly brings in and transports chemicals through the aquifer," Harvey explains. These compounds—say, carbon from sewage—could change water chemistry in a way that might trigger the release of arsenic from the sediments. To test the idea, he and colleagues at the Bangladesh University of Engineering and Technology in Dhaka and other institutions studied the groundwater chemistry in the Munshiganj District, outside Dhaka in southern Bangladesh, where many drinking-water wells are seriously contaminated.

The researchers drilled 15 new wells and then set out to alter groundwater chemistry as they suspect pumping does. In one case they injected water containing molasses, which is rich in organic carbon; arsenic levels increased substantially within days. Harvey suspects that the increase occurred because the organic carbon reduced and then dissolved the iron oxides that bear arsenic. In another experiment, injections of nitrate caused arsenic levels in the aquifer to plummet 80%, also within days. Nitrate oxidizes dissolved iron, Harvey explains, which then precipitates along with arsenic. The team believes that irrigation pumping might lower or raise arsenic levels by either mechanism, for example, by pulling in oxygenated water from sandy sediments or by drawing down organic carbon-rich water from ponds and channels.

CREDIT: C. HARVEY

Trigger. Irrigation pumping in Bangladesh can release arsenic into groundwater.

At the study site, the researchers believe that this latter mechanism has spiked the drinking water with arsenic. In the upper part of the aquifer, inorganic carbon and methane—byproducts of carbon-based reactions that liberate arsenic—are roughly 40 years old, about the same age as irrigation pumping. "The message is clear," comments Michael Berg, an environmental chemist at EAWAG. "If you pump a lot of

ScienceScope

Moving On Up A new NASA budget plan is good news for space station science and bad news for a next-generation space shuttle. The preliminary 5-year plan, presented to Congress last week, sets aside more money for biological and physical research on the orbiting laboratory. But it would also curtail work on a reusable spacecraft to replace the aging shuttle in favor of a more conventional small winged vehicle.

In the new scenario, NASA would fly five rather than four shuttle missions a year starting in 2006, allowing more research aboard both the shuttle and the station, and pump an additional $75 million into science payloads through 2007. Meanwhile, NASA would start work on the orbital space plane, which would ride aloft on an expendable launcher. The vehicle, which could be ready by 2010, would allow the station crew to accommodate seven astronauts rather than the current three, allowing more science to be done.

The plan won't cost more than NASA's current budget request, an important selling point for Congress. But some lawmakers want more information on crew size, the cost of research facilities, and shuttle maintenance. The last-minute request takes advantage of congressional inaction on NASA's 2003 budget.

Updates: Sonar and Fisheries Environmental groups challenging the deployment of a new U.S. Navy sonar have agreed to let the government conduct restricted tests. Last month, a federal judge in California blocked the Navy from testing the submarine-detection system in a 36-million-km^2 swath of the Pacific Ocean west of Hawaii, ruling that environmental regulators hadn't fully considered its impact on whales and other marine mammals (*Science*, 8 November, p. 1155). Under the deal reached last week, the Navy can run trials in a 2.5-million-km^2 slice of the contested region until next summer, when the judge expects to hear the full case.

In New England, conservationists, government officials, and the fishing industry last week asked a federal judge to delay imposing strict new catch limits pending resolution of the impact on population estimates of a misrigged research trawler (*Science*, 18 October, p. 515). Fishing groups claim that mismarked cables invalidated the estimates used to set new quotas, which are due to take effect next August. Government researchers disagree. Now, both sides want up to a year's delay to allow an independent review of the data.

Contributors: Michael Balter, David Malakoff, Andrew Lawler