National research centers in the physical sciences—such as the GSI heavy-ion research group in Darmstadt and the DESY particle physics center in Hamburg—say their equipment is already being used extensively by scientists at universities and other German research institutions. GSI's scientific director, physicist Walter F. Henning, says that about 900 of the 1000 users of the heavy-ion accelerator come from outside the center, mainly from European universities.

Although Henning thinks that program-oriented financing is a good idea, he worries that Germany may not have enough experts on the federal payroll to make the system work. "Program-oriented research is the way to go," Henning says, "but administering it effectively requires a structure that doesn't yet exist in Germany." **–ROBERT KOENIG**

PLANT BIOLOGY

Xylem May Direct Water Where It's Needed

If plants are nature's architecture, the xylem is a lowly piece of plumbing. For decades, researchers have seen the xylem as a column of dead tissue, like a worn pipe, that sits inside plant stems passively supplying water to thirsty leaves. But a surprising new study suggests that the xylem is far more active than scientists have suspected.

In a paper published online today by *Science* (www.sciencexpress.org), Harvard University plant biologist N. Michele Holbrook, with postdocs Maciej Zwieniecki and Peter Melcher, reports that gels in key xylem membranes constantly shrink and swell. With this motion, the xylem actually adjusts the flow of mineral-rich water coursing toward leaves. "Researchers assume the xylem is a bunch of inert tubes, but it's not," remarks Holbrook. "It's actually a very sophisticated system for solving a plant's water-flow problems."

"This is the first good evidence I know of that the xylem regulates water transport in plants," says John Boyer, a plant biologist at the University of Delaware, Lewes. Bioengineer William Pickard of Washington University in St. Louis adds: "This idea just came out of nowhere, and it's an excellent paper."

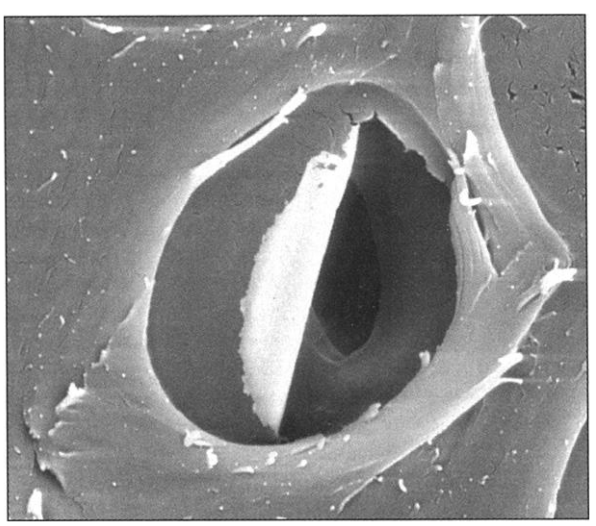
The xylem evolved millions of years ago, helping some primitive plants develop into higher vascular varieties—including angiosperms and conifers—that can survive on dry land. For much of the 20th century, researchers assumed the xylem had just two modes: on and off, or working and broken. More recently, they realized that the xylem frequently repairs breaks in its water column.

Last year, while researching xylem repair, the Holbrook team stumbled across the inspiration for their new study: a 1978 paper by Harvard biologist Martin Zimmerman. In that paper, Zimmerman's team noted that when they pumped tap water—full of everyday salts—into the xylem, it flowed much faster than deionized water. But why? The paper left the question open.

Maybe, Holbrook's group reasoned, the added salts somehow alter the xylem. To test that idea, the team cut segments of stems from laurel (*Laurus nobilis*). They tied a stem's downstream end to a tube that emptied into a cylindrical balance, measured over time. Then they fixed the upstream end to a small, pressurized tank. Using this setup, the researchers pumped water through the stem, steadily increasing the amount of potassium chloride (KCl). Sure enough, by the time the KCl concentration had increased from 0 to 50 mM, the water was flowing up to 2.5 times more quickly. Repeating the experiment with the salts NaCl, KNO_3, and $CaCl_2$, they found similar jumps in water flow.

What's more, the fast flow rates held when the researchers tested these solutions on 18 other angiosperms, five conifers, and three ferns. By contrast, when the team tried deionized water, the xylem's flow rate dropped considerably. Finally, they documented the same phenomenon in vivo, monitoring xylem uptake of salty versus deionized water in the split stem of a tobacco plant. "These changes were clearly due to some mechanical property of the xylem and the way it conducts water," Zwieniecki says.

Here they had a hint from industry: Engineers have shown that hydrogels, jellylike substances that can shrink and expand, influ-



CREDIT: M. ZWIENIECKI *ET AL.*

It's the pits. Water flowing up the xylem must cross ever-changing pit membranes like this one to reach thirsty leaves.

ScienceScope

Off the Hook ... Last week's transfer of U.S. presidential power brought good news for MIT chemistry professor John Deutch, former director of the CIA. Deutch was in the middle of negotiating a plea agreement with the Justice Department over his mishandling of classified data while at the CIA when Bill Clinton awarded him a last-minute presidential pardon. Deutch was stripped of his security clearances last August and was expected to plead guilty to a misdemeanor charge of keeping classified files on his home computer.

... And Staying On Meanwhile, NASA Administrator Daniel Goldin received another kind of reprieve: The new Bush White House accepted his offer to stay on as agency chief for a few more months until a permanent replacement is named. The list of possible successors to Goldin, who was appointed by Bush père, includes former astronaut and Senator Harrison Schmitt and Air Force General Pete Worden. And Charles Groat, director of the U.S. Geological Survey, has been spared the ax. "I very much wanted to continue and made that desire known," he said in a 22 January staff memo announcing his continued employment.

Animal Defense The United Kingdom wants to protect an ailing drug firm from animal-rights protesters. Last week the government pledged to help Huntingdon Life Sciences (HLS), Europe's largest center for animal experiments, with legislation banning protests outside employees' homes. The government may also outlaw mail threats.

For several years, employees of the Cambridgeshire firm have endured violent attacks and other abuse from protesters. Adding to the HLS's woes, activists recently claimed credit for triggering a financial crisis after pressuring a major financial backer to withdraw loans. To help out, U.K. Home Secretary Jack Straw plans to amend the Police and Criminal Justice Bill to clamp down on violent protest and spend $1.45 million to beef up security for HLS staff. U.S. financiers also stepped in to provide new financing.

Many scientists are glad that the government is acting but would like to see it do more. "These half-measures will do little or nothing to prevent the harassment," predicts Mark Matfield of the Research Defense Society, which represents scientists who experiment on animals. Protesters have vowed to continue their campaign.

Contributors: Gretchen Vogel, Wayne Kondro, Andrew Lawler, John Pickrell

ence the flow of water through a material. And plants are full of hydrogels, in the form of pectins that glue cell walls together. Could pectins regulate the xylem's water flow? They injected the xylem with solutions of varying pH and polarity, factors known to activate hydrogels. Low pH and nonpolar solvents did, indeed, spur immediate increases in xylem flow rate—a similar effect, the researchers say, to the xylem's uptake of salty water from soil.

Further experiments localized this activity to the xylem's "pit" membranes—a sievelike mesh of cellulose fibers and pectins. Water flowing up the xylem must pass through these membranes. As a plant soaks up soil minerals, the researchers suggest, the pectins can either swell or shrink. When pectins swell, pores in the membranes are squeezed, slowing water flow to a trickle. But when pectins shrink, the pores can open wide, and water flushes across the xylem membrane toward thirsty leaves above.

Now Holbrook's team wants to figure out how, exactly, plants put the xylem's water-control system to work. Zwieniecki suggests that the xylem preferentially waters branches or leaves most in need of a drink. The membrane mechanics may also help the xylem deal with drought. But the scientists are ready to be surprised—again. "It had never occurred to me that the xylem could have these inner controls," remarks Pickard. "There must be a lot more to learn here."

–KATHRYN BROWN

Kathryn Brown is a writer in Alexandria, Virginia.

NATIONAL SCIENCE FOUNDATION

Transition Rumor Targets Colwell

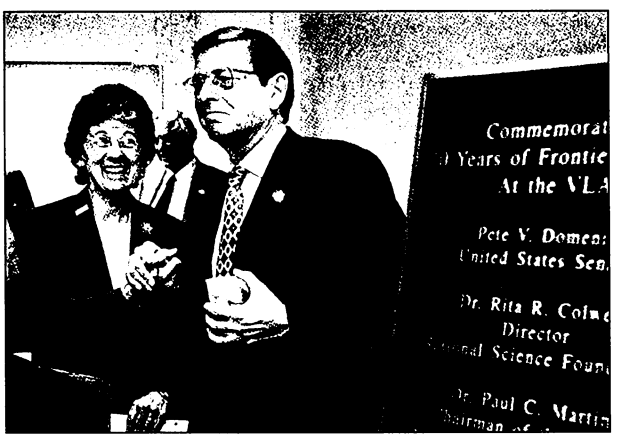
It was a classic Washington rumor. The incoming Bush Administration had told Rita Colwell, the director of the National Science Foundation (NSF), to hit the road. The supposed evidence? The head of the transition team for NSF, Richard Russell, had held a brief, get-acquainted meeting with Colwell that, according to some sources, "was a disaster." Russell, it was noted, has been a staffer on the House Science Committee, whose chair, Representative James Sensenbrenner (R–WS), had sparred publicly with Colwell and last year drafted a reauthorization bill with language intended to curb some of her powers. The message allegedly was being conveyed by former Energy Secretary James Watkins, who has been advising the new Administration on science and technology issues.

With the scientific community already nervous about the new president's commitment to basic research, the rumor spread last week like wildfire. No matter that Colwell is in the midst of a 6-year term that runs until 2004, that she had told colleagues the meeting went well, and that transition officials deny that any mention of Colwell's tenure was ever raised. Another complication is that the outgoing Clinton Administration had explicitly exempted Colwell and other presidentially chosen agency heads with "term appointments" from the need to submit their resignation—a move that makes it easier for the new president to clean house—and that Colwell has said repeatedly that she hopes to complete her term. In addition, there is little evidence that the new Administration so far has focused on science policy at all, much less on who should lead a low-profile agency like NSF.

Indeed, it may have been the absence of real news that caused things to snowball in the 48 hours preceding last weekend's inauguration ceremonies. Members of the National Science Board, NSF's presidentially appointed oversight body, contacted friends in high places to trumpet the danger of "politicizing" NSF by replacing its director in midterm. Although the board issued no public statement, Watkins, who sources say was "extremely upset" by rumors of his involvement, sent its 24 members an e-mail applauding them "for taking such a strong, timely position." Scientific societies began collecting signatures on a letter that urges the new president to maintain the "independence of the director's office" as the best way to protect the "integrity of basic research."

By Monday, the fire seemed to be subsiding. "Dr. Colwell is enthusiastically looking forward to completing her term," says her spokesperson, Curt Suplee. However, because it's impossible to disprove, and because nobody has stepped forward to claim responsibility for starting it, the rumor may continue to smolder at least until the new Administration signals its intentions toward NSF.

–JEFFREY MERVIS



Hearing whispers. Rita Colwell, with Senator Pete Domenici, hopes for more opportunities to celebrate NSF facilities like the Very Large Array (VLA) radio telescope.

CREDIT: MATT BERNHARDT/AP

CLINICAL MEDICINE

FDA to Release Data On Gene Therapy Trials

Moving to allay public concerns over the risks of gene therapy experiments, the U.S. Food and Drug Administration (FDA) last week proposed publicly releasing much of the safety and protocol data from clinical trials that it now keeps confidential. The agency wants to apply the same policy to animal-to-human transplants, another controversial experimental procedure.

Several gene therapy researchers praised the decision. "We think public fears should be assuaged, and one way to do it is to make the information available," says Inder Verma of the Salk Institute for Biological Studies in La Jolla, California, president of the American Society of Gene Therapy. Phil Noguchi, director of the cellular and gene therapy division at FDA's Center for Biologics Evaluation and Research, agrees that the proposed rules are important symbols: "It's the perception of something being hidden that's the scary part." Biotech industry officials, however, are not pleased; they worry that releasing clinical data could stifle drug development and that the public may misinterpret the safety reports.

The changes come in response to the 1999 death of 18-year-old Jesse Gelsinger in a gene therapy trial at the University of Pennsylvania in Philadelphia. The incident triggered a flurry of reports and congressional hearings on whether safety problems from this and other trials were being fully disclosed by sponsors, whether academic or commercial (*Science*, 12 May 2000, p. 951). It also revealed the confusion over current government reporting requirements.

Under the proposed rule, FDA would make public much of the information that sponsors now submit in confidence to the agency on their gene therapy clinical trials, including preclinical toxicity data, protocols, informed consent forms, ongoing reports of adverse events, and records of any FDA investigations. Under FDA rules, for example, companies must report within 7 to 15 days serious events that are unexpected and possibly related to the therapy. Companies themselves would remove personal and confidential business information from these documents, which FDA would then post on the Internet.

The Biotechnology Industry Organization (BIO) says the FDA proposal sets a "trou-