ing to the academic track, and provide leadership awards to enhance institutional efforts already under way (see table).

The case for such a program is easy to make: Women comprise only 22% of the U.S. scientific and engineering workforce, and their growing share of undergraduate and graduate enrollments is not reflected in faculty hiring and movement up the tenure ladder (*Science*, 21 July 2000, p. 379). A recent study of the University of California system, for example, shows a drop over the last 2 years in the share of new faculty appointments going to women (*Science*, 2 February, p. 806).

ADVANCING THE STATUS OF WOMEN

Award	Number	Max. funding/duration
Institutional Transformation	5–10	$750,000/year for 5 years
Fellowships	20–40	$60,000 salary; $25,000/yr. research; for 3 years
Leadership	8–12	$200,000/year for 3 years

But improving those statistics is difficult. ADVANCE's predecessor, called Professional Opportunities for Women in Research and Education, gave out nearly 500 grants over 4 years to women who needed a boost on the road to an academic career. Although satisfied with individual success stories, NSF officials felt that the program wasn't doing enough to remove institutional barriers. They also worried that restricting participation to women could make the program vulnerable to attack by foes of affirmative action.

The new program addresses both those concerns by targeting the place where academic women work. NSF hopes that its money will be a carrot for universities to reform their attitudes toward everything from dual-career couples to those needing time off the tenure track. "We're trying to look at the problem at an institutional level, to both help raise their consciousness and give them the tools to change their policies and procedures," says Norman Bradburn, head of NSF's social and behavioral sciences directorate, which will manage the program. "And one nice aspect of this program is that it's not restricted to women."

Last May, President Clinton announced the program in a Rose Garden ceremony on pay equity for women. But it wasn't until 5 February that NSF finally spelled out the details and issued a call for proposals (NSF 01-69, www.nsf.gov/home/crssprgm/advance). There's an 8 May deadline for the institutional and leadership awards, while fellowship requests are due 21 to 24 August.

Deb Niemeier, incoming chair of civil engineering at the University of California, Davis, welcomes the new program, and she sees it as a chance to get WELI off the ground. The nascent institute, a virtual structure that draws on faculty at 10 research universities around the country, plans to submit a proposal for $750,000 a year for 5 years to run workshops, provide mentoring for women academic engineers, and help universities trying to increase the number of women in administrative ranks. "I'm really excited. It's a wonderful opportunity to channel our activities," says Niemeier, a WELI board member, who organized last fall's NSF-sponsored workshop.

NSF hopes to continue the program at its current level for at least 5 years, although Bradburn says its fortunes are tied to the overall NSF budget. That could mean tough sledding, as President Bush has requested only 1.3% more for the agency in 2002, a shock after NSF's 13.5% boost in the current year (*Science*, 9 March, p. 1882). At the same time, Bradburn notes that money isn't the real impediment to change. "None of this is a substitute for academic leadership," he says. "Without a strong institutional commitment, nothing will happen." —JEFFREY MERVIS

NEUROSCIENCE

Dyslexia: Same Brains, Different Languages

Pity the poor speakers of English. New research suggests that they may be especially prone to manifest dyslexia, the language disorder that makes reading and writing a struggle, simply because their language is so tricky.

The distinctive pattern of spelling and memory problems that characterizes dyslexia has a strong genetic basis, suggesting that some neurological oddity underlies the disorder. But there appears to be a cultural component to the disease as well, because dyslexia is more prevalent in some countries than others; for instance, about twice as many people fit the definition of dyslexic in the United States as in Italy. Researchers have suspected that certain languages expose the disorder while others allow dyslexics to compensate. Now a brain imaging study backs this theory up.

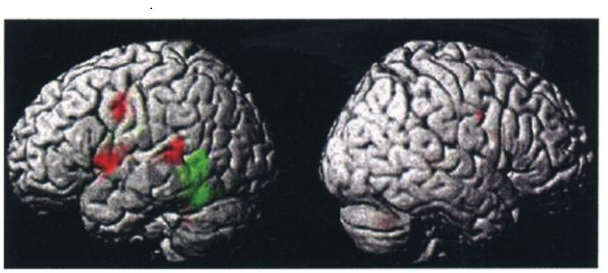
A multinational team of researchers used positron emission tomography (PET) scans to observe brain activity in British, French, and Italian adults while they read. Regardless of language, the team reports on page 2165, people with symptoms of dyslexia showed less neural activity in a part of the brain that's vital for reading.

"Neurologically, the disease looks very much the same" in people who speak different languages, says neurologist Eraldo Paulesu of the University of Milan Bicocca in Italy. "Therefore, the difference in prevalence of clinical manifestations [among different countries] must be attributed to something else." The researchers blame language.

English consists of just 40 sounds, but these phonemes can be spelled, by one count, in 1120 different ways. French spelling is almost as maddening. Italian speakers, in contrast, must map 25 different speech sounds to just 33 combinations of letters. Not surprisingly, Italian schoolchildren read faster and more accurately than do those in Britain. And it's no surprise that people have a harder time overcoming reading disorders if their language, like English or French, has a very complex, arbitrary system for spelling. "English comes with a built-in deficit," says education researcher Ken Spencer of the University of Hull in the United Kingdom.

Diagnosing a learning disability is notoriously subjective. Lack of access to good education and other social factors probably account for most reading disorders, says psychologist Richard Olson of the University of Colorado, Boulder. To avoid some of these issues, the researchers tested university students—people who have served plenty of time in classrooms and don't lack intelligence or willpower. The English and French dyslexic students have compensated for their disorder and are "very successful people," says study co-author Ute Frith of University College London, even though they need more time when taking exams and make frequent spelling mistakes.

Finding dyslexic Italian subjects was trickier, because practically no university students have been diagnosed with the disorder, Frith says. The team tested 1200 students and identified 18 with a pattern of verbal memory problems (such as difficulty remembering telephone number–like strings of digits) and slowed reading typical of the diagnosed dyslexics in France and the U.K. The "dyslexic" Italian students weren't told how they scored, but some (aware that they



Spelled out. As shown in this model, red areas are equally active in dyslexic and normal readers; green areas are sluggish in dyslexics.

CREDITS: (TOP TO BOTTOM) SOURCE: NATIONAL SCIENCE FOUNDATION; ERALDO PAULESU/UNIVERSITY OF MILAN BICOCCA

were participating in a dyslexia study) volunteered that they'd had trouble learning to read as children, Paulesu says.

Even though the Italian subjects were unaware of and unhindered by having dyslexia-like reading skills, under the PET scan they looked just like British and French students who struggled with reading. Compared to normal readers, dyslexics from all three countries showed less activation in parts of the temporal lobe while reading. The underutilized areas are familiar to neurologists: Patients with strokes in this area often lose the ability to read and spell, even though they still speak fluently.

The researchers aren't sure why the dyslexics seem to access this brain area less than normal readers do. Other PET studies and scattered neuropathological reports have led to speculation that, in general, dyslexics have fewer neural connections among cells in this region. Although most researchers think that's plausible, little consensus exists on more detailed explanations of how or why dyslexics' brains are different from those of normal readers, Olson says. His research suggests that genetic factors account for about half of someone's risk of developing dyslexia, although no single gene is likely to be to blame.

This research doesn't supply ready solutions for how to help dyslexic students overcome their reading disability, Paulesu says, short of moving to Italy, Turkey, or Spain, where spelling is simple and straightforward. So sympathize when English- or French-speaking students complain about having to memorize arbitrarily spelled words; they're right to feel wronged. –LAURA HELMUTH

CELL BIOLOGY

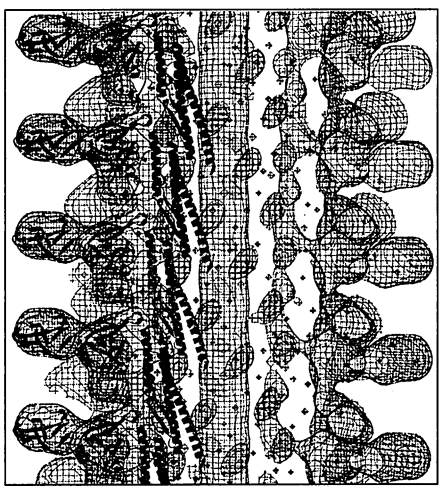
How Bacterial Flagella Flip Their Switch

Bacteria move with the agility of a tailback in American football, first cutting left, then right—all propelled by their whirling flagellar tails. Exactly how the tiny creatures achieve their feats of broken-field running has long been a mystery. New results now provide a probable solution to the puzzle.

When bacteria "run," the rotation of their flagella, long, whiplike filaments that project from the cells, is driven by motors located at the flagellar base in the bacterial membrane. The flagellar filaments are helical, and when they wind in the left-handed direction, they rotate counterclockwise. To change direction then, the bacterial cell momentarily reverses the direction of the motor, generating a torque on the flagellar filaments that flips them into right-handed helices. This causes the bacterial cell to "tumble," or change its orientation for its next run.

The mystery concerns how flagellin, the protein that makes up the filaments, achieves this dramatic structural shift. An x-ray crystallographic study of the protein described in this week's issue of *Nature* by Keiichi Namba of Matsushita's Advanced Technology Research Laboratories in Kyoto, Japan, Fadel Samatey of the Protonic NanoMachine Project, also in Kyoto, and their colleagues provides the first good look at a possible answer. It suggests that a sharp change within a very small "switch" region of flagellin is all that it takes to flip the left-handed flagellar helix into the right-handed form.

Previous structural studies, using the electron microscope and other methods, had characterized the bacterial flagellar filament to a resolution of 10 angstroms. These showed that



How they stack up. Five molecules of the protein flagellin are superimposed on a low-resolution map of a bacterial flagellar filament.

CREDIT: K. NAMBA/PROTONIC NANOMACHINE PROJECT/ERATO/JAPAN SCIENCE AND TECHNOLOGY CORP.

it is a tubular structure made up of 11 protofilaments, each formed by stacking together numerous molecules of flagellin. This protein comes in either left- or right-handed states, or L or R types, and all the molecules in a given protofilament are in the same state.

But the left- and right-handed protofilaments aren't just mirror images of one another. The repeat distance, which is the distance from any given point on one flagellin molecule to the corresponding point on the molecule above or below it, is less—by 0.8 angstroms—for the R-type protofilament. As a result, a flagellar filament containing both L and R protofilaments isn't straight but supercoils into a helix. For example, the *Salmonella* filament, which contains nine L-type and two R-type protofilaments, twists into a gentle left-handed helix. For tumbling, two of the L protofilaments are switched to the R type, and that's enough to give the filament a right-handed coil.

Researchers have long wanted to see this structural change, but that requires x-ray crystallography and they were stymied in their efforts because flagellin doesn't crys-

ScienceScope

Polytech Plum Glitzy it may not be, but Rensselaer Polytechnic Institute (RPI) in Troy, New York, has devoted admirers—including one who this week made a $360 million anonymous donation.

"A gift of this magnitude, fully unrestricted, is unprecedented," said RPI president Shirley Ann Jackson. She sees it as a vote of confidence for the Rensselaer Plan, a 5-year strategy to build stellar research programs in biotechnology—especially tissue engineering—and information technology.

Investing in Science It's a lovely problem for David Strangway, president of the Canada Foundation for Innovation (CFI). Strangway must choose between Triple-A bonds and blue chip stocks as the preferred investment vehicle for a $503 million gift from the government; the only catch is that it can't be spent until 2006–10.

The windfall is the third in the past year for CFI as the government whittles down a budget surplus (*Science*, 10 March 2000, p. 1732; 27 October 2000, p. 687). The CFI now has a war chest of $2.11 billion for competitive infrastructure grants to universities and teaching hospitals.

Although Internet stocks are definitely out, Strangway is still bullish on the prospects for solid growth. "I don't think it's unreasonable to hope that $500 million might become $670 million by the time it's needed," he says.

Dosage Details The main body that reviews U.S. gene therapy protocols plans to ramp up its scrutiny of safety reports despite complaints that it will reveal sensitive trade information.

Last week, the Recombinant DNA Advisory Committee (RAC) for the National Institutes of Health (NIH) approved a policy requiring detailed data on serious adverse effects from gene therapy experiments. The RAC has collected and made public such data for 10 years, but it wants to harmonize its requirements with those of the Food and Drug Administration (*Science*, 26 January, p. 572). A new RAC board will analyze the reports for trends. "We want to make the data more useful to everybody," says RAC chair Claudia Mickelson of MIT.

Too useful, says Michael Werner of the Biotechnology Industry Organization, who warns that forcing companies to reveal dosage levels "could be of enormous value to a competitor." The plan now goes to the NIH director.

Contributors: Michael Balter, Andrew Lawler, Constance Holden, Wayne Kondro, Jocelyn Kaiser