they would likely gain control over the movement of electrons and photons within individual wires, setting the stage for integrating devices right into the wires themselves—a development that could further shrink electronic circuits.

The three groups hit on the same solution. One team, led by Charles Lieber of Harvard University, reports its results this week in *Nature*. The other two—one led by Peidong Yang of the University of California, Berkeley, and a second led by Lars Samuelson of Lund University in Sweden—report their results in the February issue of *Nano Letters*.

To pull off the feat, all three groups tweaked the method for making single-composition nanowires. In each case they started with tiny gold particles—each just tens of nanometers across—which they placed on a surface inside a vacuum chamber. They then used either lasers or chemical methods to vaporize the semiconductors that were to make up the first segment of the wire. The semiconductor vapor condensed around the gold particle and began to crystallize out between the gold particle and the surface in a tiny cylinder that eventually raised the particle off the surface. To change the composition of the next bit of wire, the researchers simply fed the chamber a different precursor semiconductor, which was deposited between the gold particle and the previous semiconductor. Together the three teams showed that the process works for several of the most important types of semiconductors, including silicon, silicon-germanium, gallium arsenide, gallium phosphide, indium arsenide, and indium phosphide.

The striped wires could prove handy in molecular electronics, the effort to fabricate computer chips by assembling individual molecules into complex circuits. Striped nanowires are likely to make that assembly easier because they can create transistors and other devices within current-carrying wires, says Mark Gukiksen, a Harvard graduate student and first author on the *Nature* paper. Yang adds that striped nanowires should do wonders as well for thermoelectrics, materials that can use electricity to pump heat. Thermoelectrics are layered materials whose efficiency is expected to rise as their size gets smaller, a property Yang's team is now testing. Finally, Samuelson believes that the technique can be used to grow wires composed of numerous electron-trapping quantum dots. Because these dots are the basis for many quantum-computing schemes, striped nanowires could propel research in this area as well. With so many possible applications, Samuelson says, "it might quickly become a very crowded field."

–ROBERT F. SERVICE

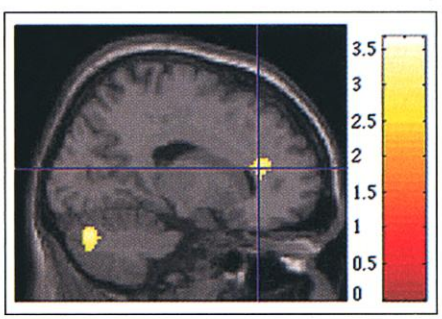
CREDIT: (TOP) P. PETROVIC *ET AL.*

NEUROSCIENCE

Drugs and Placebos Look Alike in the Brain

Researchers in Sweden and Finland say they have finally shown what scientists have long suspected: that a placebo activates the same brain circuits as painkilling drugs. This first brain imaging study of placebo analgesia, reported online this week by *Science* (www.sciencexpress.org), graphically illustrates the principle that higher brain functions help control how humans perceive pain, say the researchers, headed by neuroscientist Predrag Petrovic of Stockholm's Karolinska Institute.

Psychoneurologist Pierre Rainville of the University of Montreal describes the finding as "really great news." There is already considerable evidence that placebos harness the same endogenous painkilling circuits as do opioid drugs. But the evidence is all indirect, drawn primarily from studies showing that compounds that block opioid action also block a placebo's analgesic effect. "For at least 5 years we've been waiting for a good functional imaging study of placebo effects," says Rainville.



Painless. This is your brain on placebos.

To provide such images, Petrovic and his colleagues used positron emission tomography to scan the brains of nine men while a 48°C metal surface was pressed to the backs of their hands. The team compared brain responses after subjects were given intravenous injections—by a doctor in a white coat—of either an opioid painkiller or a placebo.

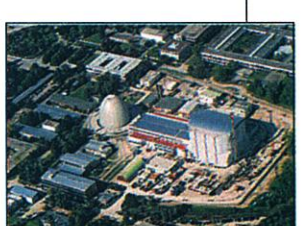
Both the genuine analgesic and the placebo led to increased blood flow in areas of the brain known to be rich in opioid receptors: the brainstem and the rostral anterior cingulate cortex (ACC), which exchanges information with a network of brain regions, including the orbitofrontal cortex, a relatively sophisticated part of the brain known to process emotions. Furthermore, those people who responded most to the placebo—according to their ratings on a scale of 0 to 100 of how much it reduced their pain—also showed more rostral ACC activation from the drug. This,

ScienceScope

Exodus, Chapter 7 Marvin Cassman, director of the National Institute of General Medical Sciences (NIGMS) in Bethesda, Maryland, announced this week that he is heading to California in May to head up a new state-funded quantitative biology institute. Cassman is the seventh top administrator to leave the National Institutes of Health (NIH) in the past 2 years, including former NIH director Harold Varmus. One vacancy has been filled: Andrew C. von Eschenbach, formerly of the M. D. Anderson Cancer Center in Houston, took the oath as director of the National Cancer Institute on 4 February.

At NIGMS, Cassman says, he favored a "complex systems" approach that applied engineering, computational science, physics, and other quantitative disciplines to basic biology. Now he intends to implement this strategy as head of "QB3," a quantitative biology consortium that includes University of California (UC) schools in San Francisco, Berkeley, and Santa Cruz. Lab construction will begin soon at UCSF's Mission Bay campus; the budget has not been set.

Delayed Again The long-awaited operation of a nuclear research reactor in Garching, outside Munich, has again been delayed, this time because of safety concerns in the wake of the 11 September attacks. The federal environment ministry says that FRM-II, which is also a neutron source, needs to develop rules for dealing with accidents and a better plan for the disposal of its spent fuel, highly enriched uranium, to prevent its use in a bomb. The delay comes amid the finalization of plans by Germany's red-green government to phase out nuclear energy production.



FRM-II was completed in August 2000, and Germany's radiation protection agency gave it a thumbs-up in December for experimental operation. The Bavarian government, which has to gain the approval of federal authorities, said it would submit a revised application by May, and federal officials have promised a speedy review.

Contributors: Martin Enserink, Robert F. Service, Eliot Marshall, Adam Bostanci

the authors write, provides new fodder for the hypothesis that "high placebo responders have a more efficient opioid system."

Jon-Kar Zubieta of the University of Michigan, Ann Arbor, who has tracked the function of the opioid receptor system implicated in the new study (*Science*, 13 July 2001, p. 311), suspects that those people who respond robustly to the placebo have increased concentrations of opioid receptors. However, he says the small number of subjects prevents any of the study's findings from being definitive.

Nevertheless, by showing the intimate relation between placebo and drug effects in the brain, the work fits with the theory that the placebo response is deeply embedded in all analgesic treatments, says neuroscientist Fabrizio Benedetti of the University of Turin, Italy. For instance, one of his recent studies shows that a painkilling injection is more effective when the patient is watching than when the drug is administered covertly.

—CONSTANCE HOLDEN

MEXICO

Cuts Add to Turmoil Over Research Spending

Mexican scientists are in an uproar over a surprise decision by the country's leading research agency to sharply cut research awards. The government of President Vicente Fox says the cuts have been blown out of proportion and are part of a major reshuffling that will result in a larger science budget. But scientists are skeptical, pointing to a series of recent actions that have raised doubts about the government's commitment to basic research.

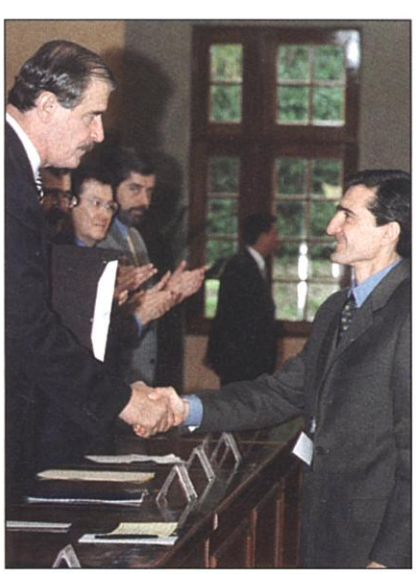
The reformist Fox began his 6-year term a year ago promising to double the budget of the National Council for Science and Technology (CONACYT), which funds research in all disciplines. But what followed was a string of financial problems. Last fall, the agency ran out of money for graduate scholarships and halted grants to visiting scientists and to attract scientists back from abroad. More recently, salary payments to researchers were delayed for several weeks.

The last straw for many scientists was the news last month that CONACYT will spend only $56 million on basic research grants and fellowships in its 2001 round of awards, a drop of 34% from the $84 million disbursed in 2000. The cut reflects a decline in the number of grants funded from roughly 1000 per year since 1996 to just 656 in 2001. "Last year was disastrous," says René Drucker, president of the Mexican Academy of Sciences. "It was one of the worst years in the history of Mexican science."

Officials at CONACYT, which oversees about 15% of the government's investment in science and technology, have tried to put the best face on these events. They say grant funding declined only slightly last year compared to the late 1990s and that 2000 was an "atypically" good year. In meetings, however, officials have explained that the agency overspent its budget in 2000 and then had to take money from 2001 funds, according to Jaime Urrutia, director of the Institute of Geophysics at the National Autonomous University of Mexico (UNAM), Mexico City. More recently, the delay of a customary $32 million end-of-the-year payment from the Ministry of Education for operating expenses forced CONACYT to borrow from the 2002 budget, says CONACYT spokesperson Armando Reyes.

The agency is also in "transition," adjunct director for scientific research Alfonso Serrano has told national media, and it plans to tap research budgets from the health, agriculture, and other federal ministries to fund new programs aimed at attacking practical problems that reflect "the country's needs." The new pot will restore some of the $28 million shortfall in the 2001 grants competition, says Reyes, and it will also reflect a 24% increase in CONACYT's 2002 budget, to $477 million.

The new programs are to begin accepting proposals this month. But that's little comfort to hundreds of scientists and students, who must now stretch existing grants for several more months or get by on personal funds. Some also worry that CONACYT's new focus on practical problems could mean less funding for basic science, says Antonio Peña of the Permanent Forum for Science and Technology, a group that advises the president. CONACYT officials, however, say there will be more money for basic research, not less.



More than praise. Mexican researchers want a greater commitment from President Fox, left.

Some scientists are hopeful that the Fox plan could eventually benefit Mexican science. "It's a new government, and we need to give them time to show what they can do," says structural biologist Lourival Possani of UNAM, Cuernavaca. But Possani and others remain concerned about the dearth of information coming from officials. "There isn't much clarity at all," Drucker says.

—JOCELYN KAISER

With reporting by Marina Chicurel, a writer in Santa Cruz, California.

CLINICAL RESEARCH

Cancer Study Lawsuit Dismissed in Oklahoma

Rebuffed. Attorney Alan Milstein plans an appeal.

A federal judge has dismissed a high-profile lawsuit claiming that a clinical trial at the University of Oklahoma violated patients' human rights under international law. The ruling derails—at least temporarily—a legal juggernaut driven by New Jersey lawyer Alan Milstein. Milstein has taken four respected clinical centers to court claiming that their research projects violated the Nuremberg Code, a set of medical rules established half a century ago in reaction to Nazi experiments. Last week, federal Judge H. Dale Cook of Oklahoma City cast doubt on that legal strategy by ruling that the Nuremberg Code can't be used as the basis of a civil suit in U.S. courts.

Milstein began testing the Nuremberg argument 2 years ago. A partner in a Pennsauken, New Jersey, firm, he made headlines when he sued the University of Pennsylvania in Philadelphia on behalf of the family of Jesse Gelsinger, a patient who died in a gene therapy trial. The university settled for a large but undisclosed sum in 2000.

Since then, Milstein has sued the Fred Hutchinson Cancer Research Center in Seattle, the University of Oklahoma Health Sciences Center in Oklahoma City, the Ohio State University Medical Center in Columbus, and Penn, this time over a second patient in the Gelsinger gene therapy trial. In all cases, the suits accused researchers and others of violating the patients' human rights under the Nuremberg Code and other international standards.

The Oklahoma case was one of Milstein's largest. Federal authorities had closed down a trial of an anticancer vac-

CREDIT: (TOP TO BOTTOM) A. MILSTEIN; NOTIMEX