Suicide Watch

Antidepressants get large-scale inspection

In the past 2 years, public and government concerns about a widely used class of antidepressant drugs have grown. There have been indications that these selective serotonin reuptake inhibitors, or SSRIs, may cause people to try to kill themselves. In March, the Food and Drug Administration instructed the makers of 10 such medications to include in their labeling a recommendation for close physician monitoring for suicidal tendencies.

Into this charged atmosphere comes an unprecedented attempt to evaluate suicides in a large population of depressed individuals taking antidepressant drugs for months or years. The study analyzed data collected on more than 2,500 patients prescribed any of four antidepressants: two SSRIs and two older drugs.

> **QUOTE**
>
> "If these drugs . . . make people more depressed, each of them is doing it to the same extent."
> *JAMES A. KAYE, Boston University*

Both attempted and completed suicides displayed a notable jump in the month after patients started antidepressant treatment, report physician Hershel Jick of Boston University School of Medicine and his colleagues. These risks were similar among people treated with an SSRI—either fluoxetine (Prozac) or paroxetine (Paxil)—or a tricyclic antidepressant—either amitriptyline or dothiepin.

Antidepressant treatment usually takes several weeks to kick in, so the suicide surge after receiving a prescription probably reflects the insidious influence of the continuing depression, Jick's group contends. However, it's also possible that all four drugs initially cause depression to worsen rapidly, leading to suicide.

"If these drugs . . . make people more depressed, each of them is doing it to the same extent, not just the SSRIs," remarks study coauthor James A. Kaye, a Boston University epidemiologist.

The new results appear in the July 21 *Journal of the American Medical Association*.

Jick's team consulted a database on medical patients treated in the United Kingdom between 1993 and 1999. That source yielded 555 depressed people, ages 10 to 69, who had begun antidepressant treatment and then ruminated about or unsuccessfully attempted suicide within 90 days. No suicide-related problems emerged for another 2,062 depressed people in the same age range who started taking an antidepressant. Rises in suicide attempts after starting antidepressant treatment were similar in teenagers and adults and in men and women.

Completed suicides increased most sharply within 9 days of beginning antidepressant treatment. Of the 17 patients who killed themselves within 3 months of taking one of the drugs, all were at least 20 years old.

Although the new report offers little to suggest that SSRIs uniquely foster suicide, it's unlikely to ease a "general crisis of confidence" in how antidepressant use is regulated, especially for children, remark psychiatrist Simon Wessely and psychologist Robert Kerwin, both of the Institute of Psychiatry in London, in an editorial published with Jick's article.

Clinical trials that uncover no beneficial or adverse effects of SSRIs on depressed adults and children often go unpublished, says psychiatrist Paul Ramchandani of the University of Oxford in England. Only in late June did one pharmaceutical company, GlaxoSmithKline, agree to publish all its data on paroxetine and post the findings online (*http://www.gsk.com*).

In company-funded trials that included more than 1,100 children and teens treated with paroxetine for depression or an anxiety disorder, no one committed suicide. Suicidal behavior occurred in 2.4 percent of youngsters during paroxetine treatment, compared with 1.1 percent of those given placebo pills. This difference wasn't statistically significant. —B. BOWER

Inside Plastic Transistors

Crystal-clear window opens on hidden flows

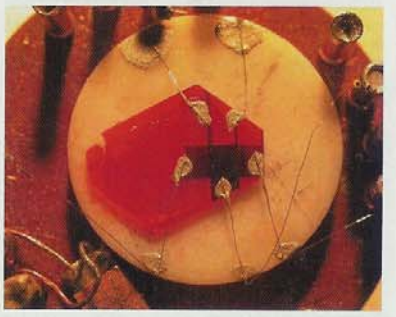
Plastic semiconductors are spawning a new breed of electronic devices that are cheap to make, lightweight, and flexible. The microscopic details of how electric charges move through transistors and other devices made of such materials have remained obscure, however.

Now, by creating a new type of transistor from such materials, known as organic semiconductors (*SN: 8/30/03, p. 133*), Vitaly Podzorov of Rutgers University in Piscataway, N.J., and his colleagues there and at the University of Illinois at Urbana-Champaign have identified crucial details regarding electric flow through those substances.

Charges move more slowly through plastic transistors than they do through transistors based on inorganic semiconductors such as silicon, the stuff of conventional electronics. The new findings indicate that this sluggish rate stems from a ball-and-chain effect: Traveling charges distort the organic materials' malleable crystal lattices and then have to drag around those distortions.

Such understanding of the fundamental behavior of organic semiconductors is vital to the future of the technology, comments Allen Goldman of the University of Minnesota, Twin Cities.

Some flat-screen computer displays already exploit organic semiconductors as light-emitting pixels. However, the range of future uses is expected to mushroom to include such products as electronic newspapers (*SN: 1/31/04, p. 67*) and digital gadgetry sewn into clothing (*SN: 11/20/99, p. 330*).



PODZOROV

RED HOT This prototype transistor on a pure crystal of the plastic semiconductor rubrene incorporates innovations expected to speed development of plastic electronics.

Researchers have had a tough time getting a clear picture of how charges move in organic semiconductors. That's because structural defects invariably riddle the thin crystalline films required for making transistors or other devices. Those defects dominate any moving charges' behavior, thereby blinding researchers to the crystal's intrinsic contribution to electronic movement.

The Rutgers-Illinois team reports the first organic transistor structure sufficiently free of crystal flaws for the intrinsic behavior of the organic material to stand out. In a yearlong progression of eliminating ever more defects, the researchers have boosted by as much as 200-fold the speed at which charges traverse their transistors.

"That's definitely an amazing leap ahead," says Alberto F. Morpurgo of the Delft Uni-

versity of Technology in the Netherlands.

Made of a thick and uniform crystal of the organic chemical rubrene, the structure also has an insulating gap of air instead of a layer of electrically insulating material, which would initiate defects in the crystal. The team, led by Michael E. Gershenson of Rutgers and John A. Rogers of Illinois, describes its work in an upcoming *Physical Review Letters*.

In their tests, the researchers observed changes in charge speed that theoretical studies and other experimental work have linked to lattice distortions, they say.

The new findings are "technically impressive," comments Morpurgo. "Two years ago, [attaining] these results would have been considered science fiction," he says.

Although organic semiconductors will probably never pose a speed challenge to silicon, traits such as their flexibility offer important advantages, Podzorov says. To match those advantages with maximum performance, he notes, researchers must figure out how to eliminate crystal defects in the thin-film components actually used in products. —P. WEISS

Quick Bite

Some gorges carved surprisingly fast

Two river gorges along the Atlantic seaboard were carved out over a geologically short period, according to analyses of rock samples from the chasms.

Many large rivers that flow eastward from the Appalachian Mountains spill through narrow gorges just before they dump into the Atlantic Ocean or Chesapeake Bay. Those geologic features are often carved into bedrock that's millions of years old, but new data hint that at least some of the chasms are much younger, says Luke J. Reusser, a geologist at the University of Vermont in Burlington.

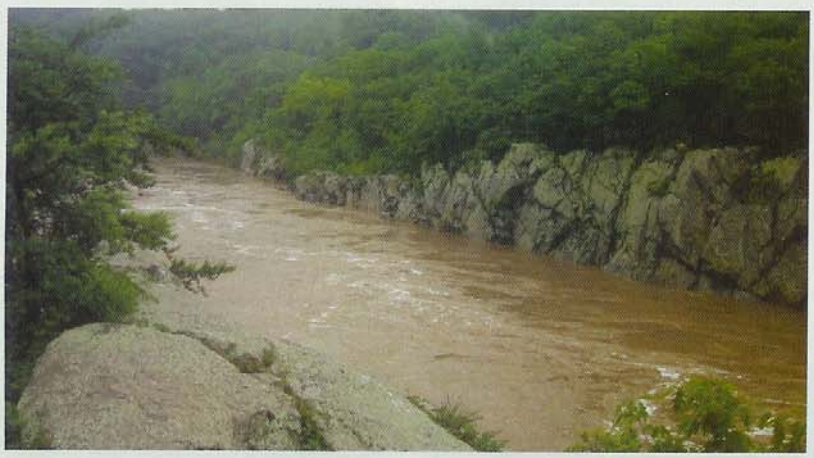
For their analyses, Reusser and his colleagues collected quartz samples from the walls and channels of two gorges, each 10 to 20 meters deep: the 3-kilometer-long Mather Gorge on the Potomac River along the Maryland-Virginia border and the 5-km-long Holtwood Gorge along the Susquehanna River in Pennsylvania. Then, the researchers tallied the samples' concentrations of beryllium-10, an isotope that's typically produced when oxygen-bearing minerals, such as quartz, are exposed to cosmic rays at Earth's surface.

Results from the Mather Gorge samples indicate that the chasm eroded downward between 37,000 and 13,000 years ago at a rate of about 80 centimeters per millennium. In the same era, erosion within Holtwood Gorge proceeded at about 50 cm per millennium. These erosion rates are tens to hundreds of times faster than scientists had suspected. The researchers report their findings in the July 23 *Science*.

The erosion rates for the two gorges are surprisingly similar, says Reusser. The Potomac drains an area of about 30,000 square km, while the Susquehanna's watershed is more than twice that size. Also, during the last ice age, the Susquehanna carried meltwater from the ice sheet that invaded the northern reaches of its watershed. The Potomac had no such influx. Therefore, the scientists speculate, the boost in erosion at both locations is probably a result of other factors, such as changes in regional climate.

The processes causing erosion in these gorges today may offer clues to the past. Only a small part of the current erosion results from the abrasion of waterborne sediment, says Reusser. Much of the sculpting occurs when strong floods pluck loose chunks of rock from the gorges' cracked walls and channels. Such floods usually occur in spring, when warm rains melt late-season snowpacks. Spring floods could have been even larger and more frequent during the last ice age, when winter snowfalls would have been greater, says Reusser.

Large spring floods during the ice age could also have resulted when meltwater built up behind ice dams and forced them to burst, says Richard B. Alley, a climatologist at Pennsylvania State University in State College. —S. PERKINS



HIGH WATER Most of the erosion along the Potomac River's Mather Gorge results from large floods, such as this one in June 2003 just upstream of Washington, D.C.

P. BIERMAN/UNIV. VERMONT

Dangerous Dust?

Chemicals in plastics are tied to allergies

Household exposure to synthetic chemicals commonly used in plastics and other products appears to increase a person's risk of developing allergies. At least two such chemicals, called phthalates, are more abundant in dust from homes where children have allergy-related illnesses than in dust from the homes of symptomfree children, a Scandinavian study has found.

Phthalates are ingredients in soft plastics, such as those used to make vinyl flooring. They're also used as softening agents in cosmetics and plastic toys.

To determine whether high concentrations of phthalates in dust correlate with allergies, Carl-Gustaf Bornehag of Karlstad University in Sweden and his colleagues visited the homes of 400 Swedish children. About half the kids had at least two of the following conditions: asthma, eczema, and rhinitis, which is an inflammation of the nose's mucous membrane. The other children selected for the study had none of these.

Children exposed to household dust with the greatest concentrations of di(2-ethylhexyl) phthalate (DEHP) were 2.9 times as likely to have asthma as were children exposed to the lowest concentrations of that phthalate. Similarly, children in homes with the greatest concentrations of butyl benzyl phthalate were 3.0 and 2.6 times as likely as the other children to have rhinitis and eczema, respectively, Bornehag and his colleagues report in an upcoming *Environmental Health Perspectives*.

Four other phthalates showed no significant link with any of the three disorders.

The new study is the first to reveal different phthalate exposures in children with