Why greenbacks make good 'drug money'

Where there's money, there's cocaine.

This aphorism doesn't just indicate the extent to which modern culture has embraced mood-altering drugs—it's a fact. Fully 78 percent of the $1 bills circulating in Miami carry traces of cocaine, a federally funded study has found. So do similar shares of singles in Houston and Chicago. The only difference is that Miami's currency tends to carry more of the white powder.

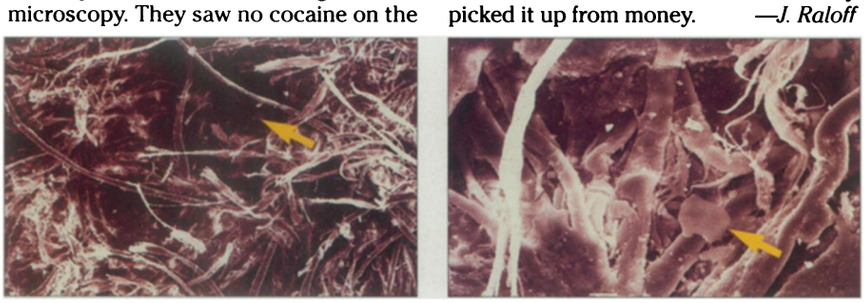
In conducting the analyses that established those numbers, Jack Demirgian of Argonne (Ill.) National Laboratory (ANL) and his colleagues handled hundreds of cocaine-tainted bills—some bearing as much as 1 milligram each. Yet while the chemists' skin readily absorbed cocaine from other contaminated items, it never picked up the drug from dollars.

To figure out why, Demirgian enlisted the help of Benjamin S. Tani, also of ANL, to study the bills with scanning electron microscopy. They saw no cocaine on the bills' surface; instead, they found it wedged in the nooks and crannies below.

Magnified, the currency's linen fibers "look almost like hacksaw blades," Demirgian notes. "We think that cocaine particles on the surface become fractured by the natural bending of the bills" and fall into the irregular holes formed by the money's fibers. British paper currency, which his team examined this summer, has more rounded fibers and far smaller holes—none apparently large enough for the cocaine crystals to enter.

"I think this study showed that [U.S.] money does like to hold onto the drugs that it comes into contact with," says Kent Lunsford of the Office of National Drug Control Policy in Washington, D.C. The finding, he says, seems to undermine the argument many lawyers had been tendering: that clients caught with cocaine on their hands had innocently picked it up from money. *—J. Raloff*

Demirgian and Tani/ANL



Left: Micrograph of a dollar's surface shows fibers' bladelike edges and a relatively large hole (arrow), about 100 micrometers across at its narrowest dimension. Right: A roughly 10-μm cocaine particle (arrow) trapped in such a hole.

Feds tackle toxic cell

What started as one state's problem in the early 1990s, then escalated into regional trouble this summer commanded the attention of national legislators last week. A congressional subcommittee held a day of hearings on state and federal responses to recent outbreaks of toxic *Pfiesteria* on the East Coast (SN: 9/27/97, p. 202).

Questions about the extent of the fish-killing microorganism's threat to human health prompted the hearings, convened by the human resources subcommittee of the House Committee on Government Reform and Oversight.

The issue of water quality and its connection to *Pfiesteria* outbreaks came up repeatedly. "Any new public health policy on this issue needs to consider the reduction of nitrogen and phosphorus pollution in our waters," emphasized the Environmental Protection Agency's Robert Perciasepe in written testimony. The House has approved a $3 million addition to the National Oceanic and Atmospheric Administration budget for *Pfiesteria* research and monitoring in coastal waters.

It also voted to bolster the federal Centers for Disease Control and Prevention with $7 million for work on the microorganism's potential public health impact. The agency sponsored a workshop this week to develop a formal description of symptoms for physicians to use in identifying people who may have been affected by toxic *Pfiesteria*.

Human health effects so far seem linked to exposure to water that contains the toxic cell and not to eating seafood. The Food and Drug Administration is analyzing oysters exposed to toxin-producing *Pfiesteria* in the lab. Although its analysis isn't complete, preliminary results indicate that the oysters are not toxic, said FDA's Fred Shank.

Similarly, gulls have snapped up fish killed by *Pfiesteria* with no obvious harm. "Wildlife seems not to be affected," said *Pfiesteria* researcher JoAnn M. Burkholder of North Carolina State University in Raleigh. However, potential effects have not been well studied, she cautions.

More hearings and related bills are in the works. *—C. Mlot*

Atoms bounce back to form frigid cloud

A cloud of trapped atoms chilled to temperatures just above absolute zero serves as a handy instrument for detailed studies of a variety of subtle quantum phenomena.

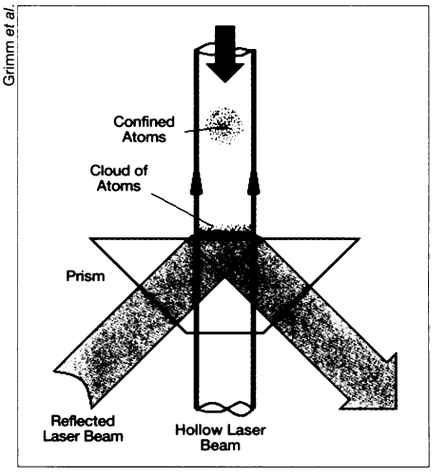
Now, researchers have developed an apparatus that can cool as many as 100,000 cesium atoms to 3 microkelvins to form a thin layer floating 20 micrometers above the surface of a prism. Because the final stage of confinement involves no magnetic fields, this technique offers the advantage of trapping atoms without altering their magnetic states.

Rudolf Grimm and his colleagues at the Max Planck Institute for Atomic Physics in Heidelberg, Germany, describe their gravito-optical surface trap in the Sept. 22 PHYSICAL REVIEW LETTERS.

In the trap, cold cesium atoms fall downward onto the flat, horizontal surface of a prism. When they reach the prism, the atoms interact with an electromagnetic field created by a laser beam reflecting off the underside of the prism's surface. A tiny portion of the laser beam's energy leaks upward from the surface, generating what is called an evanescent wave.

The atoms rebound, then drop again, and with each bounce lose a little of their energy to the evanescent wave. After several bounces, they settle into a nearly two-dimensional cloud above the prism surface. *—I. Peterson*

Grimm *et al.*



In the gravito-optical surface trap, cesium atoms are initially confined in a magnetic field and slowed down by laser beams. Gravity then pulls the atoms downward. At the surface of a prism, illuminated from below by a laser beam, the atoms interact with the reflected beam's electromagnetic field and rebound, losing some of their energy. Eventually, the atoms collect in a cloud just above the prism. A hollow, vertical laser beam encircling the atoms keeps them from spreading out horizontally.