BEHAVIOR

Hey bud, ya' want some pure Domino?

Why the big magillah over saccharin? If people want to diet, can't they simply keep away from sweetened foods? Not most people, says Michael Cantor of Columbia University.

Sugar and other sweeteners have, and have always had, an almost mystical power to lure people and control behavior, Cantor and Richard J. Eichler write in the April CHEMTECH, a monthly publication of the American Chemical Society. "As sugar becomes economically accessible," the psychologists say, "people in all cultures, past and present . . . are only too eager to do whatever is necessary to consume inordinate quantities of the stuff. The higher the concentration of sweetener, the greater the preference and the more avid the behavior in its pursuit."

Because the average American now consumes nearly one-third pound of sweeteners per day, according to Cantor, "the technologist and policymaker have in their hands a supernormal reinforcer that can be used to control the behavior of people just as surely as the circus trainer has the wherewithal to control the behavior of dancing bears." Among the recent laboratory studies they site as evidence of the reinforcing power of sugar are two rat experiments at Rutgers University. In one test, the animals were given access to food only one hour a day, and had access to nutritious food and sugar water. They preferred sweetness, with resultant loss of weight and subsequent death from malnutrition, Cantor and Eichler report. In a second experiment, alcohol-addicted rats could be weaned from alcohol only by sugar or saccharin.

Unconnected observations by Alan C. Levin at the New York Institute for Child Development point to a possible link between sugar and hyperactivity, the April 25 BEHAVIOR TODAY newsletter reports.

Cantor and Eichler smartly sidestep the question of whether sweeteners might be addictive. "Sweets, like opiates, are immediate, supernormal reinforcers," they say. "Perhaps most tellingly, the demand for both substances is inelastic. Despite the four-fold increase in the price of sucrose in 1974, per-capita consumption of sweeteners fell only 3 percent. . . . We have tried to demonstrate that sweet taste does more than taste wonderful."

Now, a methadone substitute

A new heroin substitute, methadyl acetate, is better in several respects for treating addiction than the widely used methadone, University of Chicago researchers report. Edward C. Senay, Walter Dorus and Pierre F. Renault say methadyl acetate, an analog of methadone, has several advantages, including: It need be administered only three times a week, rather than seven times a week for methadone, and no weekend dose is given for self-administration—thereby cutting down chances for black-market sale. On the minus side, methadyl acetate's dosage seems to vary with some individual patients, making it more difficult on occasion to establish proper dosage levels for certain addicts.

The researchers tested 97 addicts with methadyl acetate against 96 on methadone. Over a 14-week period, about 75 percent in each group remained heroin-free, they report. Senay suggests that methadyl acetate may be the drug of choice for "patients with relatively good psychosocial adjustment." But, he says that some drug abusers may have a compulsive need for daily treatments and feel more secure with methadone. He proposes that some patients might be stabilized on methadone and later switched to methadyl acetate. The research was supported by a grant from the State of Illinois Department of Mental Health and Developmental Disabilities.

PHYSICAL SCIENCES

From our reporter at the meeting of the American Physical Society in Washington

X-ray burster search

One of the more exciting mysteries in high-energy astrophysics today is the so-called X-ray bursters—sources that produce short sharp intense bursts of X-rays. The bursts can reach more than one-million times the power of the sun, stay there for several seconds and then fall back to a tenth or a hundredth of the peak intensity.

Exactly what mechanism can produce such spectacular cosmic fireworks is the major question. At the meeting, Walter H.G. Lewin of the Massachusetts Institute of Technology revealed plans for a concerted effort to identify one or more X-ray bursters with optical, infrared or radio objects in the hope of learning more about their astrophysics. In June and July, 35 astronomers operating in those ranges of the spectrum will engage in observations of six bursters coordinated with the X-ray-observing satellite SAS-3 in the hope of making some identifications and gaining some non-X-ray spectral information that may help solve the astrophysical problem.

Seeing single atoms

A group of physicists at the University of Minnesota, G.W. Greenlees and five others, have developed a means whereby a single atom can be "seen" as it crosses a beam of laser light. The technique depends on the principles of resonant light absorption and reradiation by atoms. Every atom has a spectrum of precise frequencies of light that it will absorb from an incident light beam and then reradiate.

The Minnesota group uses tunable dye lasers to provide intense, sharply defined beams of light tuned to a frequency of a given atom. The typical time for absorption and reradiation is about 10 nanoseconds. The time a room-temperature atom takes to cross the laser beam is about 10 microseconds, so one atom will leave a trail of scattered light flashes. The group reports that they have been able to track single barium atoms.

The laser tuning is fine enough to take advantage of isotope shift—the minute difference in resonant frequencies between isotopes of the same element. The group hopes to use the technique to study the sizes, moments and other characteristics of nuclei of different isotopes. The sensitivity of the technique may also make it useful in studies of pollution and contamination.

Antimatter in the universe

It may be necessary to use extraterrestrial instruments to discover whether any of the stars and galaxies we can see are made of antimatter, according to John G. Cramer of the University of Washington. The question is one of the most vexing in cosmology: The laws of particle physics demand a balance between matter and antimatter, so there should be antistars or antigalaxies to balance those of ordinary matter.

Ordinary light will not tell the difference. However, electrons emitted in beta decay processes spin in opposite directions depending on whether matter or antimatter is the source. Force fields in space can cause these electrons to slow down, and as they do they will emit the light rays called *bremsstrahlung*. The polarization of the light will correspond to the electron spins, and detecting it will distinguish matter from antimatter. Cramer thinks the method will probably not be sensitive enough for ordinary stars and will probably have to use novas or supernovas. Equipment outside the earth's atmosphere will also be necessary.